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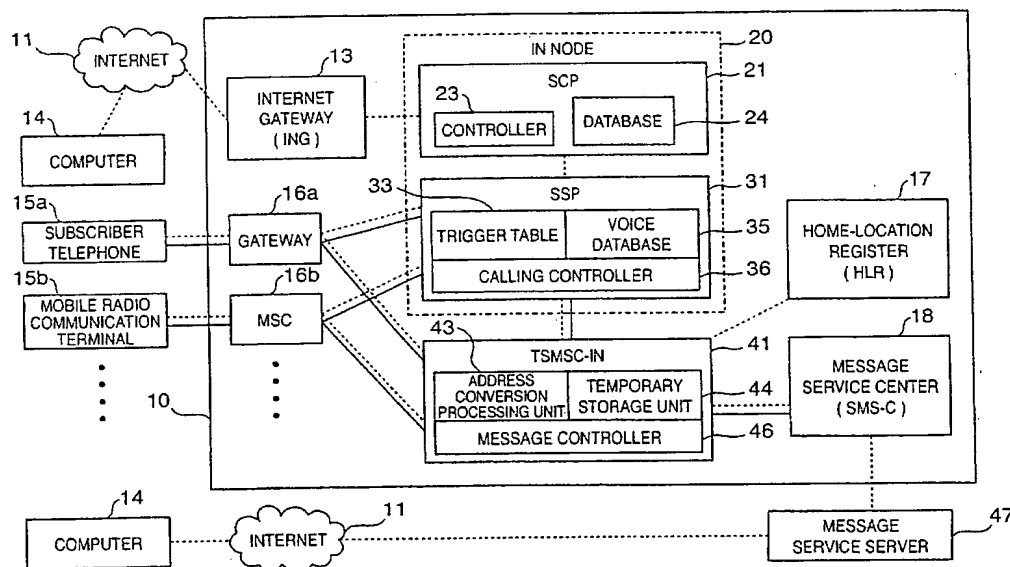
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(54) Title: MOBILE RADIO COMMUNICATION SYSTEM



(57) Abstract: A mobile radio communication system in which setting of incoming-call refusal service for mail services such as short messages and electronic mail can be performed simply and reliably is disclosed. According to the system of the invention, an address conversion processing unit (43) is provided for converting addresses in such a manner that transmission-source information of a message can be handled by an IN node (20) that processes an incoming-call refusal service in telephone calls. This makes it possible to process the source of transmission using numerals even with regard to mail, received via a network such as the Internet, in which transmission-source information contains characters other than numerals.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DESCRIPTION

MOBILE RADIO COMMUNICATION SYSTEM

5 TECHNICAL FIELD

This invention relates to a mobile radio communication system and, more particularly, to an incoming-call refusal service in a mobile radio communication system that is capable of communicating
10 text.

BACKGROUND ART

Cellular telephones and PHS (Personal Handy Phone system) telephones have become widespread rapidly in recent years. With the increase in number of users, problems involving malicious telephone calls (referred to as "annoying calls" below) such as harassing calls also are increasing just as in the case of wired-subscriber calls. For this reason, there has been proposed a service (an
20 incoming-call refusal setting service) in which when a called party has received such annoying calls, the called party can make a setting to refuse incoming calls from the same telephone number. [For example, see "Malicious Call Barring Service" (NTT DoCoMo Technical Journal Vol. 1, No. 1, 1999, pp. 36 to 40).]
25

In accordance with this service, the called party calls a predetermined incoming-call refusal service number

(a special number) immediately after the annoying call is disconnected and registers the transmission source of the call just received as an incoming-call refusal number, whereby a subsequent incoming call will be refused.

5 In this case use is made of the other party's number of the last call stored by the exchange on a per-subscriber basis, as a result of which it is possible for the registering party to register the transmission-source telephone number of the annoying telephone call as the
10 object of incoming-call refusal without knowing the number.

 Meanwhile, various additional services besides the basic call service are being provided for cellular telephones and PHS telephones. A message service is a
15 typical example of such an additional service. Message services can be classified broadly into two services, namely short-message service in which comparatively short textual information is communicated between terminals by specifying the telephone number of the receiving terminal,
20 and Internet-mail service in which electronic mail is communicated via the Internet or other communication network by specifying the mail address of the party that is to receive the mail.

 An incoming-call refusal service similar to that for
25 voice calls has been proposed for messages as well. Specifically, only a message that has been sent using a secret number (a so-called PIN code) registered beforehand by the subscriber is received, or the subscriber registers

the number or mail address of a party to be refused to the subscriber's own terminal, thereby barring incoming messages from the registered party.

Alternatively, an effect similar to that of incoming-call refusal can be obtained by making it possible for an user to change his/her own mail address freely and setting it so that only messages directed to the changed address will be received.

However, the method in which the subscriber inputs an address of an incoming call to be refused to his/her own terminal involves the following problems:

1) Since the subscriber makes the input using the keys on the terminal, the setting takes time and effort and there is a possibility that an erroneous number will be set.

2) In a case where the subscriber does not know the number or address of the party whose incoming call is to be refused, an incoming call cannot be refused.

20 DISCLOSURE OF INVENTION

Accordingly, an object of the present invention is to provide a mobile radio communication system in which setting of incoming-call refusal service for mail services such as short messages and electronic mail can be performed simply and reliably.

Specifically, the gist of the present invention is a mobile radio communication system capable of handling transmission and reception of messages between subscriber

terminals or between a subscriber terminal and a computer connected to an external network, characterized by having: message storage means for storing a message that has been transmitted to a subscriber of the mobile radio communication system; transmission-source information extraction means for extracting transmission-source information from the message that has been stored in the message storage means; incoming-call permission decision means for detecting whether the transmission-source information has been registered as an incoming-call refusal number of a transmission-destination subscriber of the message; message transmission means for transmitting the message to the transmission-destination subscriber in a case where the incoming-call permission decision means has decided that the transmission-source information has not been registered as the incoming-call refusal number; and answering means for answering, by voice and/or a message indicating the effect that the incoming call has been refused, a transmission source of the message, in a case where the incoming-call permission decision means has decided that the transmission-source information has been registered as the incoming-call refusal number.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a block diagram illustrating an example of the configuration of a mobile radio communication system according to an embodiment of the present invention;

Fig. 2 is a flowchart useful in describing operation

for refusing an incoming message in the mobile radio communication system according to the embodiment of the present invention;

Fig. 3 is a flowchart useful in describing operation
5 for refusing an incoming message in the mobile radio communication system according to the embodiment of the present invention;

Fig. 4 is a diagram illustrating the flow of signals
in a case where incoming-call refusal is reported by a voice
10 announcement in the mobile radio communication system according to the embodiment of the present invention;

Fig. 5 is a diagram illustrating the flow of signals
in a case where incoming-call refusal is reported by a
message in the mobile radio communication system according
15 to the embodiment of the present invention;

Fig. 6 is a diagram illustrating the flow of signals
in a case where a message is transmitted without refusing
an incoming call in the mobile radio communication system
according to the embodiment of the present invention;

20 Fig. 7 is a diagram useful in describing transmission-source information stored in a temporary storage unit 44 in a case where the subscriber number of a transmission source is not known in the mobile radio communication system according to the embodiment of the
25 present invention;

Fig. 8 is a diagram useful in describing address conversion processing executed in a case where the subscriber number of a transmission source is not known

in the mobile radio communication system according to the embodiment of the present invention; and

Fig. 9 is a flowchart useful in describing processing for registering an incoming-call refusal number in the mobile radio communication system according to the
5 embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[First Embodiment]

10 A preferred embodiment of the present invention will now be described in detail with reference to the drawings. In the description that follows, an "incoming-call refusal service" includes, in addition to a service for refusing an incoming call from a specific transmission source, a
15 case in which an incoming call from a party other than a specific transmission source is refused (i.e., in which an incoming call is allowed only from a specific transmission source and incoming calls from all other sources are barred).

20 Fig. 1 is a block diagram illustrating the overall configuration of a communication network which uses a mobile radio communication system according to an embodiment of the present invention.

A mobile radio communication system 10 comprises an
25 Internet gateway (ING) 13 for connecting the Internet 11 directly to an intelligent network node (IN node), described later; an IN node 20 for processing an additional service such as an incoming-call refusal service; a gateway

switch 16a for making a connection to a public switched network (PSTN); mobile services switching center (MSC) 16b... for making a connection to mobile communication terminals; a IN node interface for message services
5 (TSMSC-IN) 41; a home-location register 17; and a message service center (SMS-C) 18.

In order to set or change various services, the mobile radio communication system 10 is capable of communicating with a computer 14 connected to the Internet 11 via the
10 Internet gateway 13 as well as with a subscriber telephone 15a of the PSTN via the gateway switch 16a and mobile radio communication terminals 15b via the MSCs 16b. The SMS-C 18 sends and receives electronic mail to and from the computer 14 via a message service server 47 connected to
15 the Internet 11. In this specification, a mobile radio communication terminal capable of sending and receiving electronic mail is regarded as the computer 14.

In Fig. 1, a switching network present between the subscriber telephone 15a and the gateway switch 16a and
20 a switching network (radio base station, etc.) present between the mobile radio communication terminals 15b and the MSCs 16b are not shown.

The IN node 20 has a service control point (SCP) 21 which, depending upon the type of additional service (IN
25 service) such as the incoming-call refusal service to which a subscriber has subscribed, executes control corresponding to this service, and a service switching point (SSP) which actually executes call processing based

upon service control by the SCP 21.

The SCP 21 has a database 24 for storing various information necessary for IN services, and a controller 23 for controlling individual IN services.

5 The SSP 31 has a trigger table 33 which instructs the SCP 21 to invoke a service corresponding to the IN service to which the subscriber has subscribed; a voice database 35 for storing voice guidance and voice messages to be transmitted to the subscriber in an IN service; and
10 a calling controller 36 for executing voice processing.

 The TSMSC-IN 41 has a temporary storage unit 44 which accepts short messages and electronic mail for subscribers to this system from the SMS-C 18, and which stores, for every destination subscriber, transmission-source
15 information of the latest received message; an address conversion processing unit 43 which, in a case where a subscriber that is the destination of a message has subscribed to the incoming-call refusal service, converts the transmission-source information to a format capable
20 of being handled by the IN node 20; and a message controller 46 for executing message control.

 Each of the SCP 21, SSP 31 and TSMSC-IN 41 can be implemented by a general-purpose computer, and the functions of these units can be performed by having a CPU
25 execute a program that has been recorded on a storage device such as a hard-disk drive.

 The home-location register (HLR) 17 is, e.g., a database which stores, for each subscriber to this system,

a telephone number, terminal information, subscriber service content and position information, etc., and which can be searched using telephone numbers.

The SMS-C 18 is a device for temporarily storing and
5 distributing short messages and electronic mail accepted from the subscribers to the system or from the computer 14.

(Processing for refusing incoming messages)

Processing for refusing incoming short messages or
10 Internet mail (both of which will be referred to simply as "messages" below) in this system will be described with reference to the flowcharts of Figs. 2 and 3. In the description that follows, reference will also be had to Figs. 4 to 6, which illustrate the flow of signals in the
15 mobile radio communication system shown in Fig. 1, in order to facilitate understanding of the invention. Fig. 4 illustrates a case where refusal of an incoming call is reported by a voice announcement, Fig. 5 a case where refusal of an incoming call is reported using a message,
20 and Fig. 6 a case where a message is transmitted normally.

First, all messages that have been transmitted to subscribers to this system are stored temporarily in the SMS-C 18. In a case where the transmission source of a message is a subscriber within this system (assumed to be
25 subscriber 15c in Fig. 4), the message is transferred to and stored in the SMS-C 18 via a base station (BS) 19a, MSC 16b and TSMSC-IN 41, as indicated by arrows a ~ d in Fig. 4. In a case where a message is electronic mail that

has been transmitted via a network such as the Internet, the message is transferred to and stored in the SMS-C 18 from the computer 14, which is the transmission source, via the Internet 11 and message service server 47, as indicated by arrows a' ~ c' in Fig.4.

In a case where the transmission-destination address of electronic mail is not a subscriber number but an address set by the subscriber, the message service server 47 uses its internal database to convert the transmission-destination address to a subscriber number.

Next, the SMS-C 18 transfers the received message, the subscriber number of the transmission destination and the transmission-source information to the TSMSC-IN 41 (step S101; arrow e in Fig. 4).

The message controller 46 of the TSMSC-IN 41 stores the transferred information in the temporary storage unit 44 and acquires information relating to the transmission-destination subscriber (assumed to be subscriber 15d in Fig. 4) from the HLR 17 together with information indicating the location of the transmission-destination subscriber (step S102; arrows f, g in Fig. 4). More specifically, the HLR 17 is searched based upon the subscriber number of the transmission destination, and information is acquired indicating whether the subscriber terminal of the transmission destination is a terminal that is capable of receiving the message or not and whether the subscriber of the transmission destination has subscribed to the

incoming-call refusal service or not.

It is determined whether the subscriber terminal of the transmission destination is capable of receiving the message or not (step S104). If reception is not possible, the message is discarded from the temporary storage unit 44 upon passage of a predetermined period of time (step S105). In a case where the original message remains in the SMS-C 18, the message controller 46 of the TSMSC-IN 41 instructs the SMS-C 18 to discard the message.

10 In a case where the subscriber terminal of the transmission destination is capable of receiving the message, it is determined whether the subscriber of the transmission destination has subscribed to the incoming-call refusal service or not (step S106). If this subscriber has not subscribed to the incoming-call refusal service, control proceeds to step S122 and the message is transferred to the transmission-destination subscriber 15d via the MSC 16b.

If the transmission-destination subscriber 15d has subscribed to the incoming-call refusal service, whether the transmission source is the object of incoming-call refusal by the transmission-destination subscriber 15d needs to be investigated at the IN node (SSP 31 and SCP 21). The purpose of the IN node ordinarily is call control, and the IN node handles subscribers based upon the subscriber numbers. In a case where the information which specifies the transmission source includes non-numeral characters, such as in the case of Internet mail, the IN

node cannot process such information as is.

Accordingly, whether a subscriber number is included as transmission-source information or not is investigated (step S108). If a subscriber number is not included, then
5 address conversion processing for converting the transmission-source information to a numeral is executed for the sake of processing at the IN node in such a manner that the information can be handled by the IN node (step S111). The address conversion processing will be
10 described later in greater detail.

In a case where a message is one that has been transmitted from terminal equipment within the mobile radio communication system 10, it is the subscriber number of the transmission source and not transmission-source
15 information set by the transmission-source user that is reported in the exchange between the base station and the switch within the mobile radio communication system, even if the transmission-source information can be changed freely by the transmission-source user. This means that
20 address conversion processing is not necessary in this case, and it will suffice if use is made simply of the subscriber number contained in the transmission-source information.

Next, the message controller 46 of the TSMSC-IN 41 transfers to the SSP 31 the information that is necessary
25 to process the incoming-call refusal at the IN node (step S112; arrow h in Fig. 4). The necessary information includes the subscriber number of the transmission destination, information (TICK) indicating the type of

service to which the transmission-destination subscriber has subscribed, and transmission-source information (the subscriber number or the number obtained by the conversion performed by the TSMSC-IN 41).

5 When these items of information have been received, the trigger table 33 in the SSP 31 instructs the SCP 21 to invoke the service corresponding to the TICK, namely the incoming-call refusal service (step S113; arrow i in Fig. 4). The subscriber number of the transmission
10 destination and the transmission-source information also are transferred to the SCP 21.

 The controller 23 of the SCP 21 actuates the incoming-call refusal service in response to the command from the trigger table 33 and checks to determine whether
15 the transmission-source information that was transferred from the SSP 31 has been registered in a list or not, stored in the database 24, of incoming-call refusal numbers corresponding to the subscriber number of the transmission destination (steps S114, S115).

20 If the information has been registered in the list, it is decided to use a voice or message announcement as means for notifying the transmission source that the incoming call has been refused (step S116). The decision may be made based upon content registered in advance. If
25 the transmission-source information is a subscriber number, a voice message may be used; otherwise, a message may be used. Of course, it is possible to make the decision using other criteria. For example, if one message is implemented

and cannot be transmitted normally, the other message may be implemented.

In case of the voice announcement, the controller 23 of the SCP 21 commands the call controller 36 of the
5 SSP 31 to notify the transmission source using a voice announcement from the voice database 35 that reports refusal of the incoming call (step S117; arrow j in Fig. 4).

In response to this command, the calling controller
10 36 of the SSP 31 calls the transmission source using the subscriber number of the transmission source, reads the voice announcement reporting refusal of the incoming call out of the voice database 35 and provides it to the transmission-source subscriber (step S118; arrows m, n,
15 o in Fig. 4).

When notification is completed, the calling controller 36 of the SSP 31 instructs the message controller 46 of the TSMSC-IN 41 to erase the message that has been stored in the temporary storage unit 44 (step S121). At
20 this time the call-source information and call-destination subscriber number that have been stored in the temporary storage unit 44 may be preserved or may be deleted. In the system of this embodiment, however, the arrangement is such that the transmission-source information and
25 transmission-destination subscriber number of the incoming message received last are always stored in the temporary storage unit 44. From the standpoint of keeping processing simple, therefore, it is preferred that only

the message be deleted.

If it is found at step S116 that notification of incoming-call refusal by way of a message has been decided, then the controller 23 of the SPC 21 reports notification
5 of the incoming call refusal to the TSMSC-IN 41 via the SSP 31 (step S119), as indicated by the arrow p in Fig. 5.

In response to being so notified, the message controller 46 of the TSMSC-IN 41 instructs the SMS-C 18
10 to send an incoming-call-refused message back to the transmission source (step S120; arrow q in Fig. 5) and deletes the message that has been stored in the temporary storage unit 44 (step S121).

The SMS-C 18 sends an incoming-call refusal
15 notification message, which has been registered in advance, back to the transmission source. This message is transmitted to the originating subscriber 15c via the TSMSC-IN 41, MSC 16b and base station 19a (arrows r, s, t, u in Fig. 5). Further, if the transmission source is
20 the computer 14, an equivalent incoming-call refused message is transmitted via the message service server 47 and the Internet 11 (arrows r', s', u' in Fig. 5).

If it is found at step S115 that the transmission-source subscriber has not been registered in
25 the list of incoming-call refusal numbers of the transmission-destination subscriber, this fact is reported from the SCP 21 to the TSMSC-IN 41 via the SSP 31. In response to being so notified, the message

controller 46 of the TSMSC-IN 41 reads the information necessary for message transmission, namely the message, the subscriber number of the transmission destination and the subscriber number or address of the transmission source,
5 out of the temporary storage unit 44 and transmits this information to the MSC 16b to which the transmission-destination subscriber belongs (step S122; arrow v in Fig. 6). When transmission ends, the message is erased from the temporary storage unit 44.

10 The MSC 16b transfers the message to the base station 19b at which the transmission-destination subscriber 15d is located (step S123; arrows v, w, x in Fig. 6).

Processing for refusing an incoming-call message is thus executed.

15 (Address conversion processing)

Address conversion processing executed at step S111 in Fig. 2 will now be described in detail with reference to Figs. 7 and 8.

With regard to address conversion processing, set
20 forth above, the original purpose of the IN node is to perform ordinary call control, and the arrangement is such that subscribers are handled by numbers. As a consequence, information containing characters (in general) other than numerals, such as an address used in the Internet mail,
25 cannot be handled. Accordingly, in order to perform the refusal of an incoming message though use of the IN node that handles the incoming-call refusal service in ordinary calls, it is necessary that an address containing

characters other than numerals be replaced by a numeral which the IN node can handle.

Before explaining the specific procedure of address conversion processing, the handling of an address in a case
5 where a message is one that has been transmitted from a terminal within the mobile radio communication system 10 will be described with reference to Fig. 7. In this message processing, the subscriber number of the transmission source is reported and used in processing internally of
10 the system, in a manner similar to that of an ordinary call, even in a case where the subscriber is capable of freely setting his or her own address.

Accordingly, in the case of a message of this kind, the transmission-source telephone number (subscriber
15 number) of the message is extracted from the transmission-source information reported by the SMS-C 18 and this is stored as the transmission-source information of the temporary storage unit 44 and is used in notifying the IN node 20 [(a) in Fig. 7]. As a result, if registration
20 has been specified, then, in processing (described later) for registering a number in the list of incoming-call refusal numbers, the telephone number of the transmission source is stored in the list of incoming-call refusal numbers corresponding to the subscriber who specified
25 registration [(b) in Fig. 7].

Accordingly, even if messages have been transmitted from the same terminal, i.e., from the same subscriber number, under different addresses, incoming-call refusal

is carried out based upon the subscriber number. If registration is performed once, therefore, there is no need to perform registration again subsequently.

5 In a case where a message is mail that has been received via a network such as the Internet, on the other hand, the transmission source may not necessarily be a telephone. Even if the mail has been transmitted from a telephone, therefore, the subscriber number is not reported to the SMS-C 18 in this case.

10 In a case where the subscriber number of a transmission source has not been reported, therefore, the address conversion processing unit 43 of the TSMSC-IN 41 executes address conversion processing using an address conversion table, which is not shown. It will be assumed,
15 as illustrated in Fig. 8, that the SMS-C 18 has reported 090-aaaa-bbbb (where each of a and b is one of integers of 0 to 9), which is a subscriber number, as transmission-destination information, and cde@cde.cde as transmission-source information.

20 The address conversion table has records composed of pairs of non-repeating consecutive numbers, which are given in numerical order starting from 1, and electronic-mail addresses corresponding to these consecutive numbers, as illustrated in Fig. 8. In a case
25 where notification has been given of an electronic-mail address that is to undergo conversion processing anew, the TSMSC-IN 41 searches the address conversion table for a empty record.

The search for the empty record may be conducted in order starting from the beginning of the address conversion table, starting from the record that immediately follows a record in which registration was finalized last, or by
5 some other method. In the description below, however, it is assumed that the table is searched in order from the beginning, i.e., from Record No. 1, and that use is made of the empty record found first.

In the example of Fig. 8, Record No. 2 is empty [Fig.
10 8(a)]. Accordingly, the TSMSC-IN 41 registers the transmission-source information cde@cde.cde provisionally in Record No. 2 of the address conversion table [Fig. 8(b)]. The TSMSC-IN then stores this record number in the temporary storage unit 44 as the subscriber
15 number of the transmission source [Fig. 8(c)]. As a result, if the transmission-destination subscriber has subscribed to the incoming-call refusal service, the TSMSC-IN 41 reports "2" to the IN node as the transmission-source information transmitted.

20 Further, the record number at which an electronic-mail address has been stored in the address conversion table is used also as the transmission-source information of a just-received incoming message employed in processing for registering numbers in the list of
25 incoming-call refusal numbers, described later. Accordingly, if the transmission-destination subscriber of subscriber number 090-aaaa-bbbb has registered electronic mail from the transmission source of address

cde@cde.cde as incoming mail to be refused, then "2" will be registered in the list of incoming-call refusal numbers [Fig. 8(d)].

If after the message from cde@cde.cde is received
5 processing for registering a number in the list of incoming-call refusal numbers is performed before another message is received anew, the content that has been stored provisionally in the address conversion table is finalized [Fig. 8(e)]. On the other hand, if a new message is received
10 before a number is registered in the list of incoming-call refusal numbers, the content that has been stored provisionally in the address conversion table is erased [Fig. 8(f)]. The status of the address conversion table thus returns to that prevailed prior to address conversion
15 processing [Fig. 8(a)].

In this case, the record undergoing provisional registration may be searched for using any method. The address conversion table may be provided with a flag area indicating the recording undergoing provision
20 registration or an area which stores the number of the record undergoing provision registration may be provided separately, and it is possible to specify the record undergoing processing by referring to these areas.

In the example described above, use is made simply
25 of record numbers starting from "1". However, in a case where the IN node is capable of handling only subscriber numbers of prescribed digits as the subscriber numbers, a series of numbers not employed as telephone numbers may

be used instead of the record numbers.

In a case where transmission-source information reported by the SMS-C 18 is an electronic-mail address, the TSMSC-IN 41 searches the address conversion table. If
5 transmission-source information has already been registered, the TSMSC-IN 41 reports this registered record number to the IN node as transmission-source information.

Thus, in the mobile radio communication system according to this embodiment, even electronic mail can be
10 provided with the incoming-call refusal service using an IN node that is for voice communication.

(Registration processing)

Reference will now be had to Fig. 9 to describe processing for registering numbers in the list of
15 incoming-call refusal numbers in the mobile radio communication system according to this embodiment.

In order to register a new party in the list of incoming-call refusal numbers, it will be assumed in this embodiment that registration is carried out by calling a
20 predetermined number (a special number) for the incoming-call refusal service and operating the operation keys of a terminal in accordance with voice guidance.

First, the MSC 16b detects whether a call has been made to the special number for the incoming-call refusal
25 service (step S201). If a call to the special number has been detected, the MSC 16b queries the HLR 17 for TICK information (the same as that for the incoming-call refusal service) for this special number (steps S202 and S203) and

sends the SSP 31 the call together with TICK (step S204).

On the basis of the TICK reported, the trigger table 33 of the SSP 31 instructs the SCP 21 to activate the incoming-call refusal service. Further, the trigger table 5 33 transfers information such as the subscriber number of the calling party and the special number to the SCP 21 (step S205).

On the basis of the indication from the trigger table 33, the SCP 21 invokes the incoming-call refusal service 10 (step S206). Further, the trigger table 33 recognizes from the special number reported that the call is a customer control call (which requests number registration or deletion processing) in the incoming-call refusal service. The trigger table 33 then determines whether the subscriber 15 number of the calling party has been registered in the subscriber list of incoming-call refusal service (step S207).

If the calling party has not subscribed to the incoming-call refusal service, the SPC 21 instructs the 20 calling controller 36 of the SSP 31 to read voice guidance, which indicates non-subscription to the incoming-call refusal service, out of the voice database 35 and to transmit this guidance to the calling party (step S212).

If the calling subscriber has subscribed to the 25 incoming-call refusal service, the SCP 21 instructs the calling controller 36 of the SSP 31 to read voice guidance, which is for subscribers to the incoming-call refusal service, out of the voice database 35 and to transmit this

guidance to the calling party (step S208).

In response to being so instructed, the calling controller 36 of the SSP 31 reads the voice guidance out of the voice database 35 and transmits it to the calling subscriber. Then, the SCP 21 identifies a DTMF signal transmitted from the terminal of the calling subscriber in response to the voice guidance and decides the type of processing (registration, activation of deletion service, end of processing) desired by the calling subscriber (step S209).

In a case where registration processing has been designated, the transmission-source number of an incoming message received last, that has been stored in the temporary storage unit 44 for calling subscribers in TSMSC-IN 41, is registered as is in association with the calling party (step S210). If registration has been completed, this is reported to the calling subscriber by voice guidance and the calling subscriber is allowed to select whether to exit processing as is or to proceed to other processing (step S211).

If, in response to the voice guidance, processing other than registration processing, i.e., deletion of an already registered incoming-call refusal number, has been designated, then the corresponding processing is executed (step S213).

Thus, when an incoming message arrives, the subscriber can cause processing to register/delete an incoming-call refusal number to be executed merely by

calling a special number and specifying registration in accordance with voice guidance without the subscriber himself entering the address of the incoming message.

In the example set forth above, the description deals
5 mainly with an operating mode in which an incoming message from a specific transmission source registered in advance is refused. However, in case of an operating mode in which all messages from sources other than a specific
10 transmission source are to be refused, it will suffice to adopt an arrangement in which the specific transmission source is registered and all messages from sources other than this registered transmission source are refused through a method similar to that of the case described above.

15 In accordance with the present invention, as described above, it is possible to provide, through a simple arrangement, an incoming-call refusal service for messages. As a result, even if a transmission source having the same subscriber number undergoes a change in address, it is
20 possible to refuse an incoming call reliably without requiring re-registration of a number in the list of incoming-call refusal numbers.

CLAIMS

1. A mobile radio communication system capable of handling transmission and reception of messages between subscriber
5 terminals or between a subscriber terminal and a computer connected to an external network, characterized by having:
- message storage means for storing a message that has been transmitted to a subscriber of said mobile radio communication system;
- 10 transmission-source information extraction means for extracting transmission-source information from the message that has been stored in said message storage means;
- incoming-call permission decision means for detecting whether said transmission-source information
15 has been registered as an incoming-call refusal number of a transmission-destination subscriber of said message;
- message transmission means for transmitting said message to said transmission-destination subscriber in a case where said incoming-call permission decision means
20 has decided that said transmission-source information has not been registered as said incoming-call refusal number; and
- answering means for answering, by voice and/or a message indicating the effect that the incoming call has
25 been refused, a transmission source of said message, in a case where said incoming-call permission decision means has decided that said transmission-source information has been registered as said incoming-call refusal number.

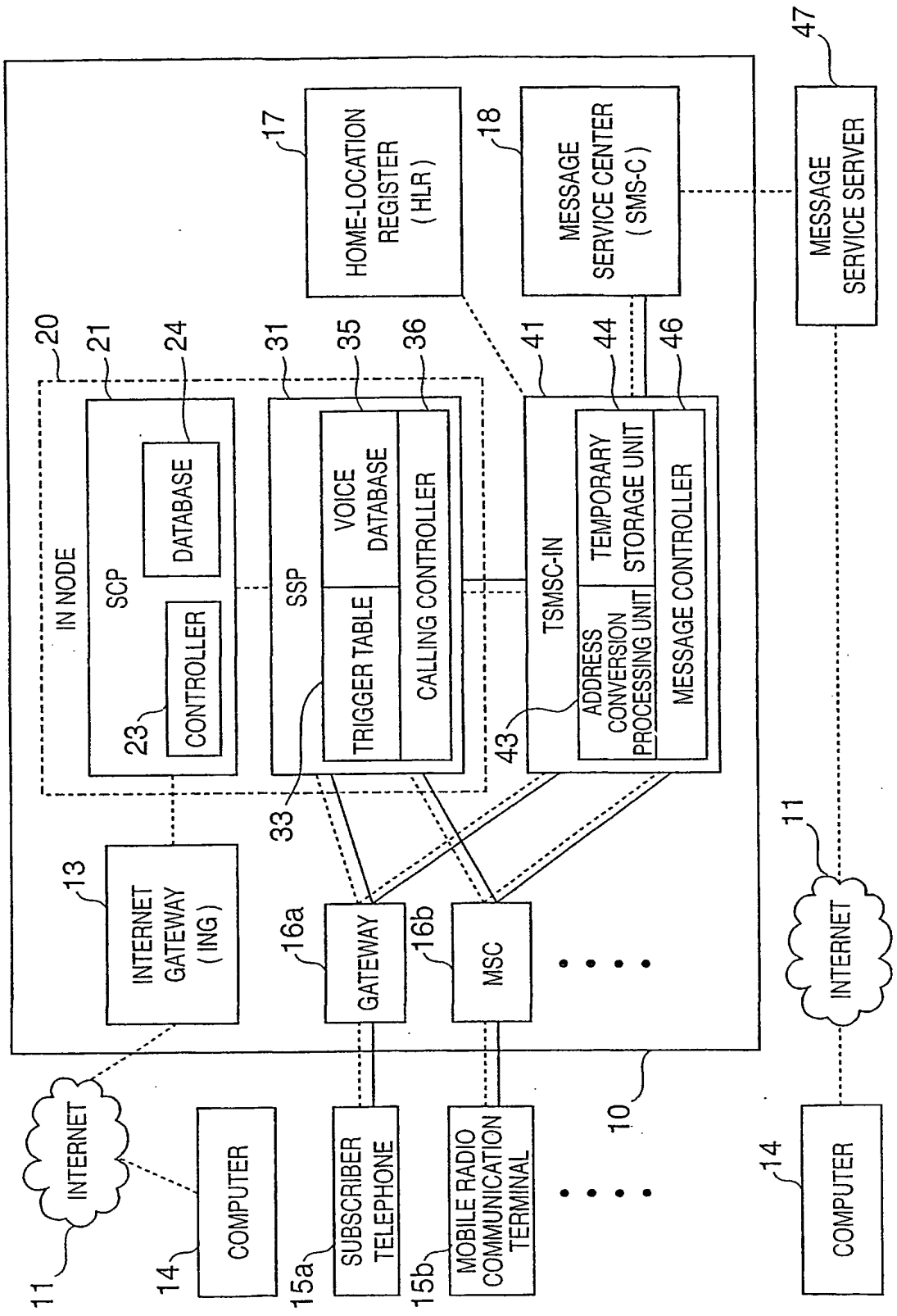
2. A mobile radio communication system according to claim 1, characterized in that said incoming-call permission decision means renders a similar decision with regard to a voice call as well.

5 3. A mobile radio communication system according to claim 1 or 2, characterized by further having conversion means which, in a case where said transmission-source information contains given characters, converts the characters to a format capable of being processed by said
10 incoming-call permission decision means and supplies them to said incoming-call permission decision means as said transmission-source information.

4. A mobile radio communication system according to any one of claims 1 to 3, characterized by further having
15 temporary storage means for storing, on a per-user basis, transmission-source information of an incoming message received last.

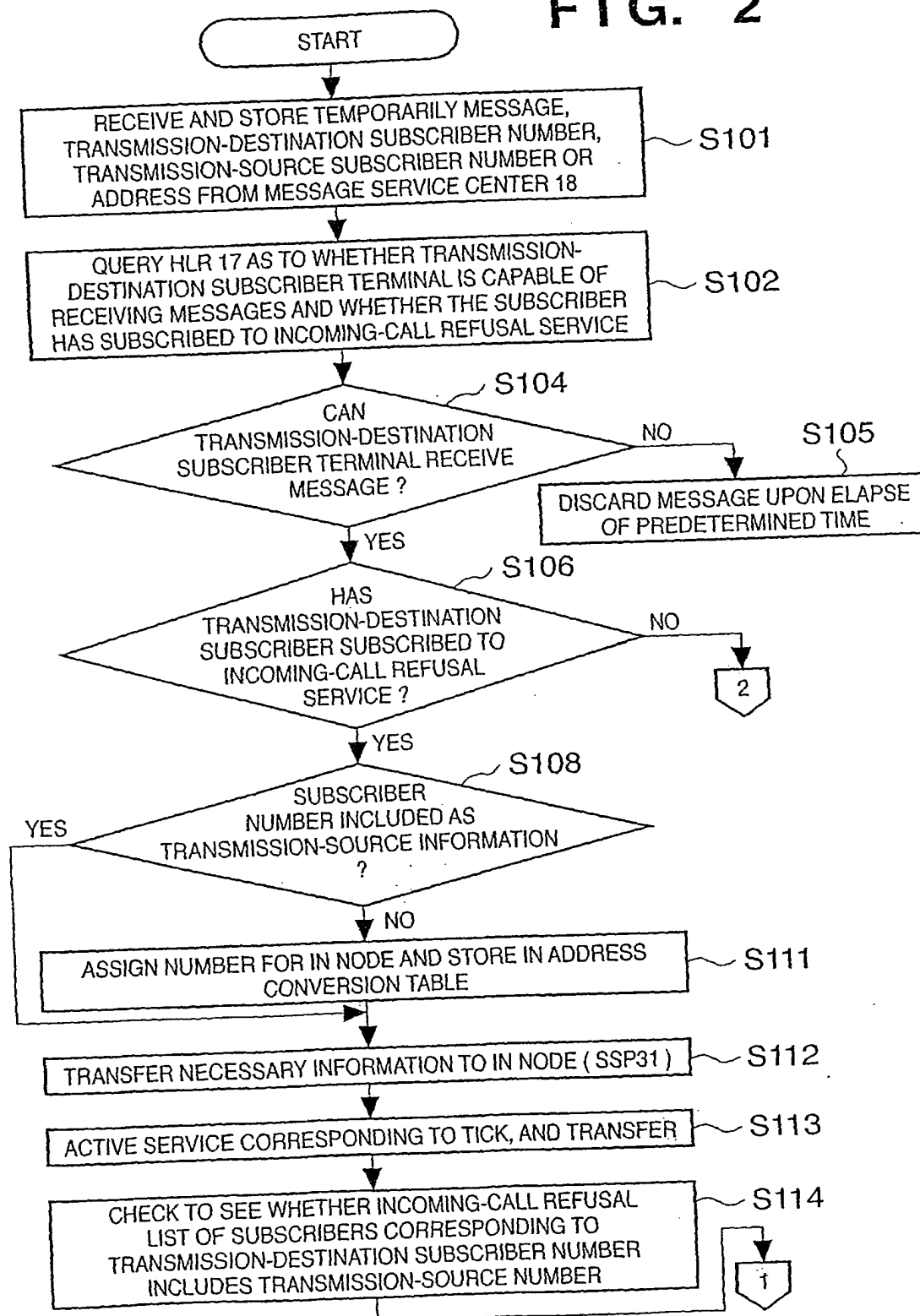
5. A mobile radio communication system according to claim 4, characterized by further having registration means
20 which, in a case where said subscriber has issued a request to register an object of incoming-call refusal, registers the transmission-source information, which has been stored in said temporary storage means, as said incoming-call refusal number.

FIG. 1

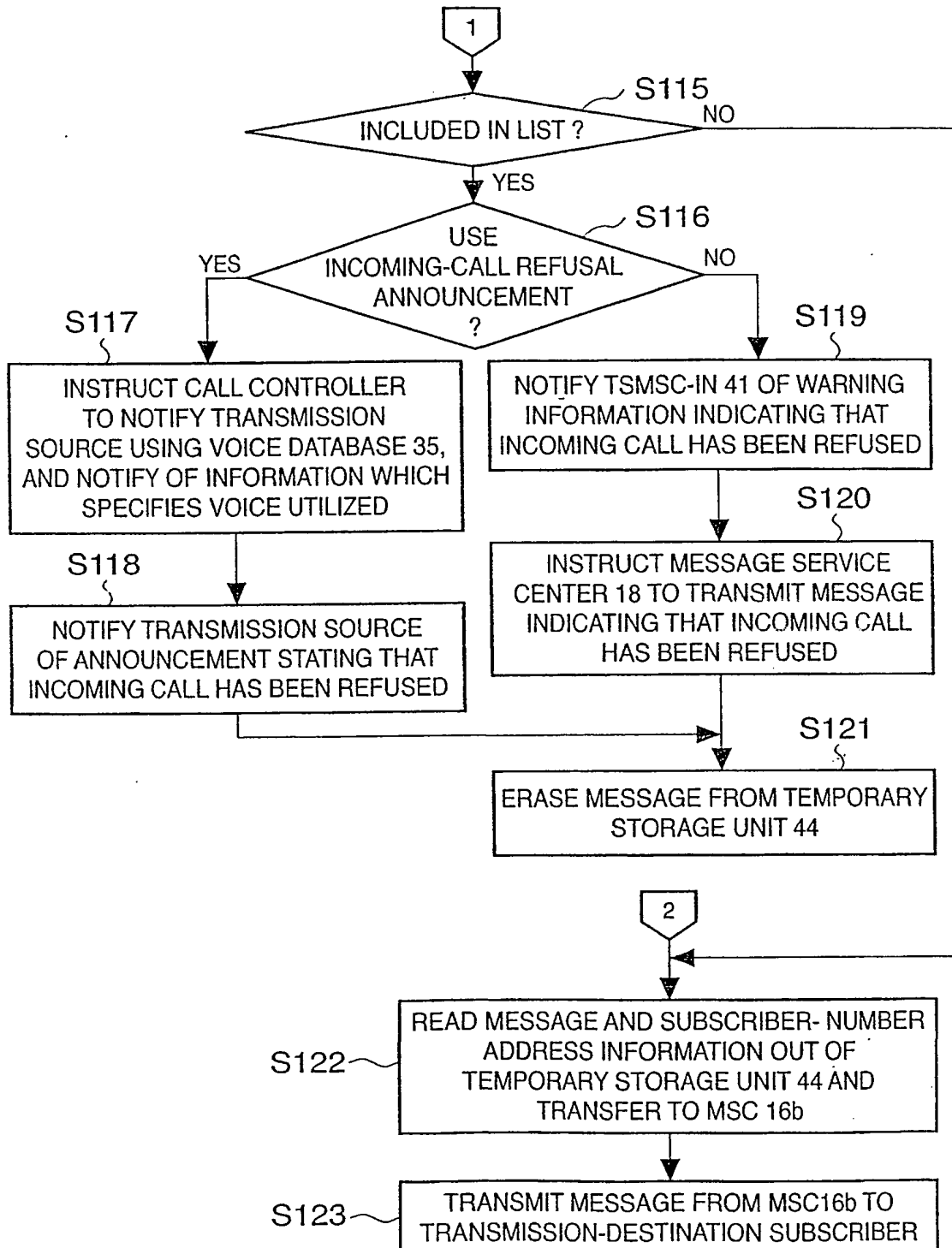


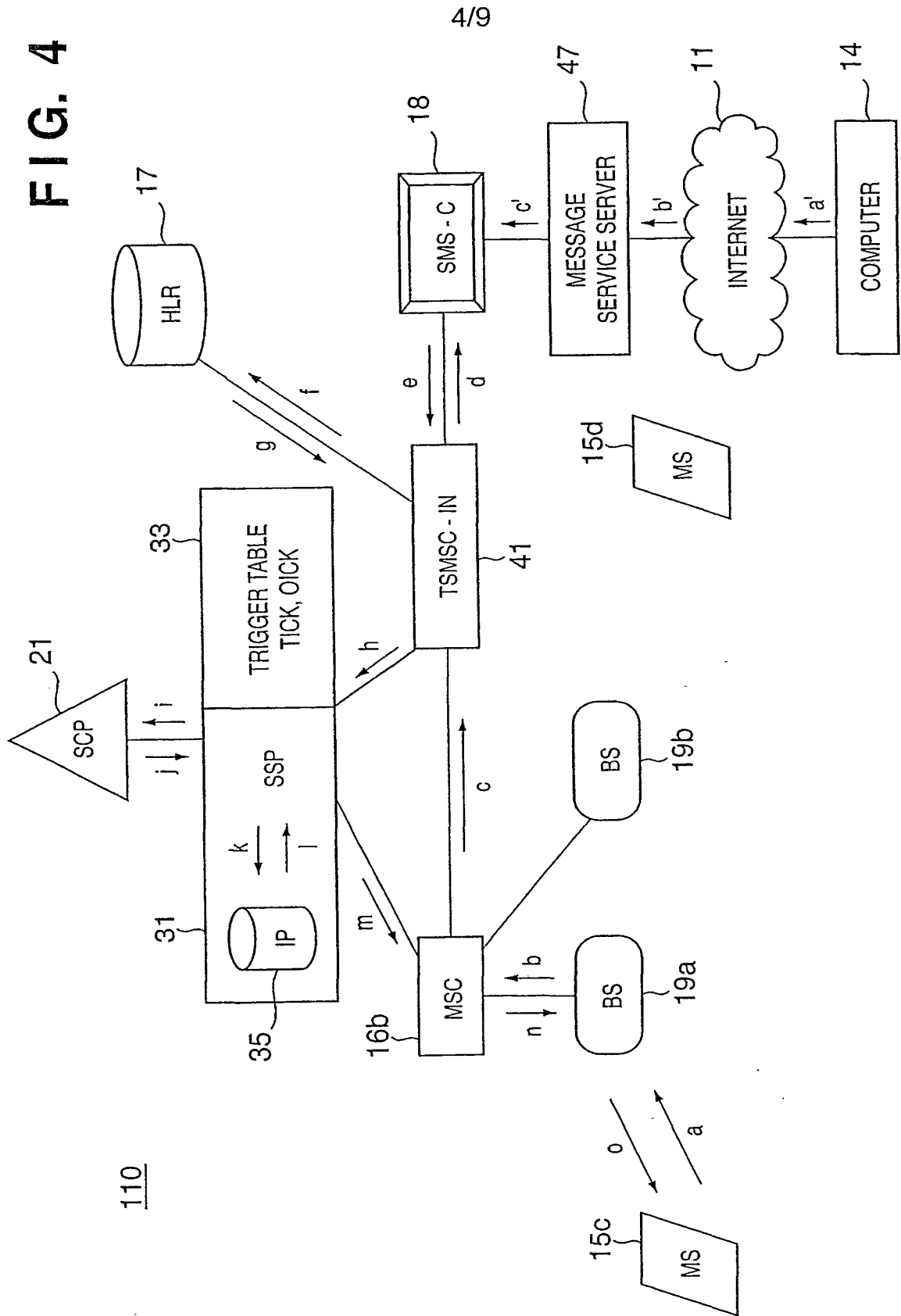
2/9

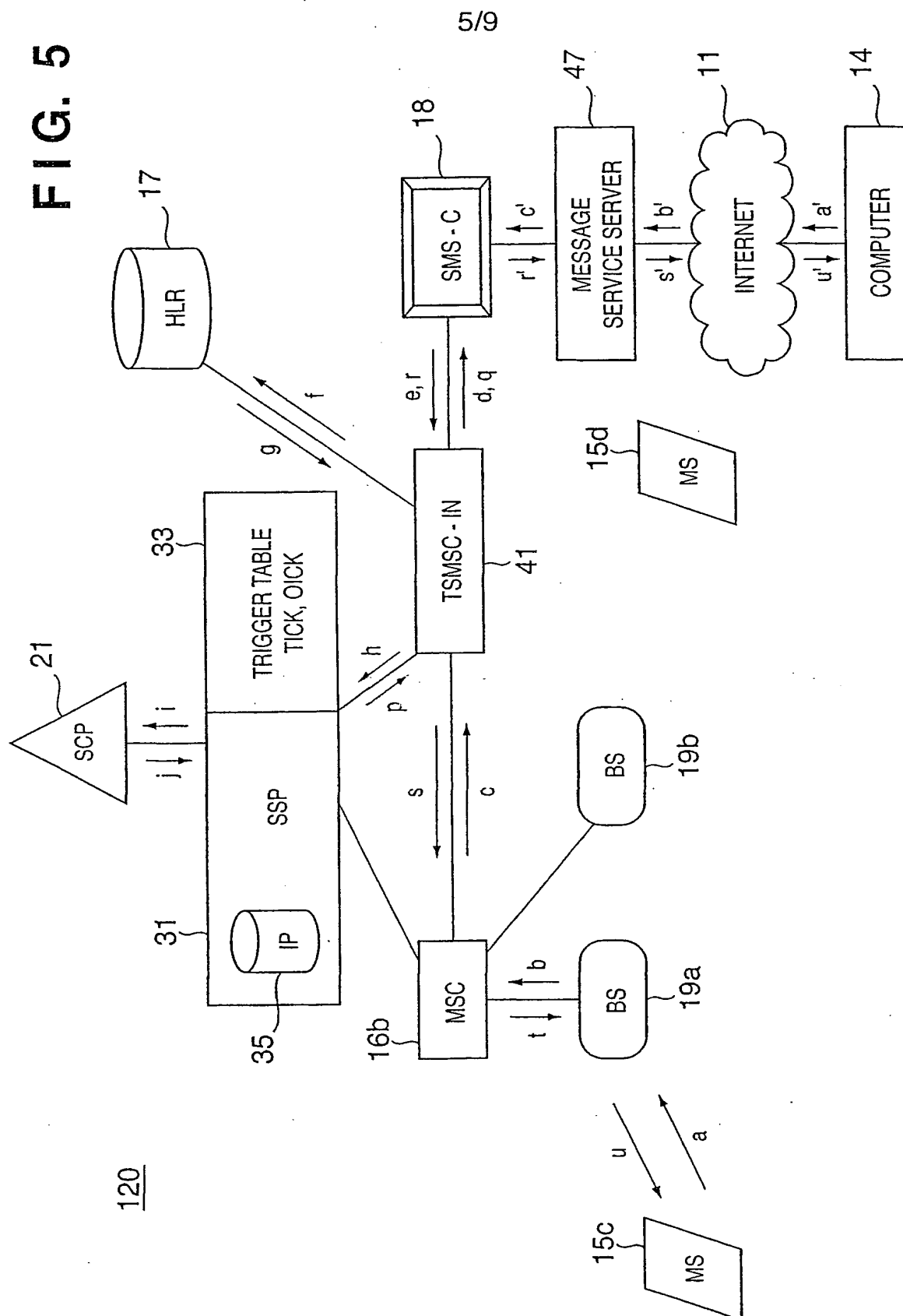
FIG. 2



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FIG. 3





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Fig. 6

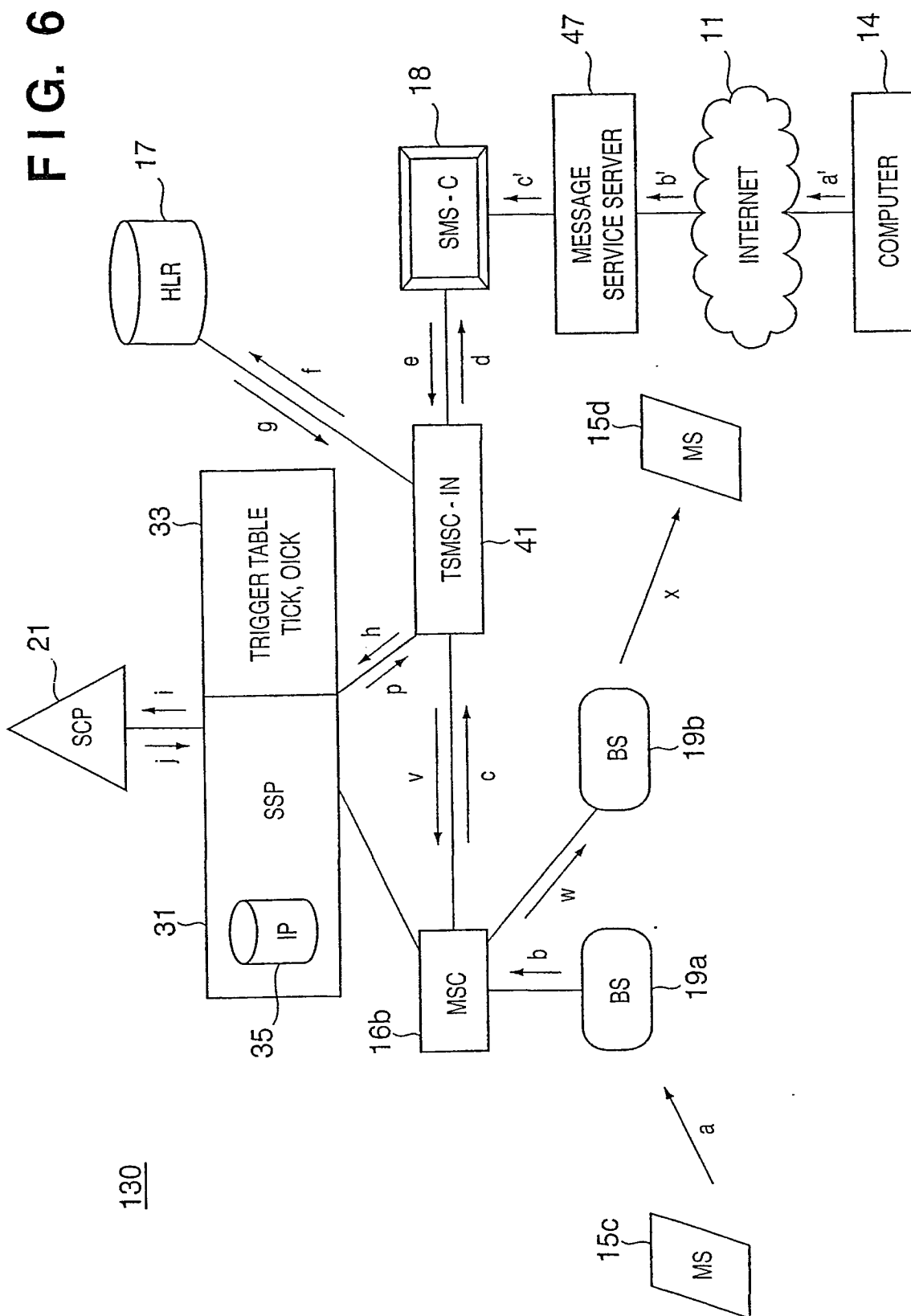
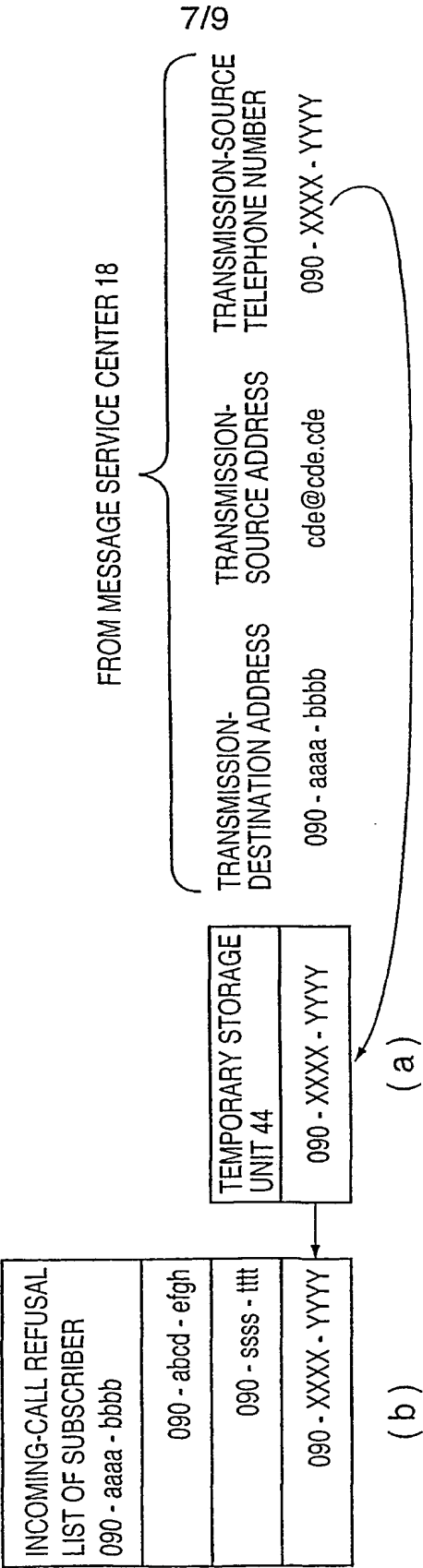


FIG. 7



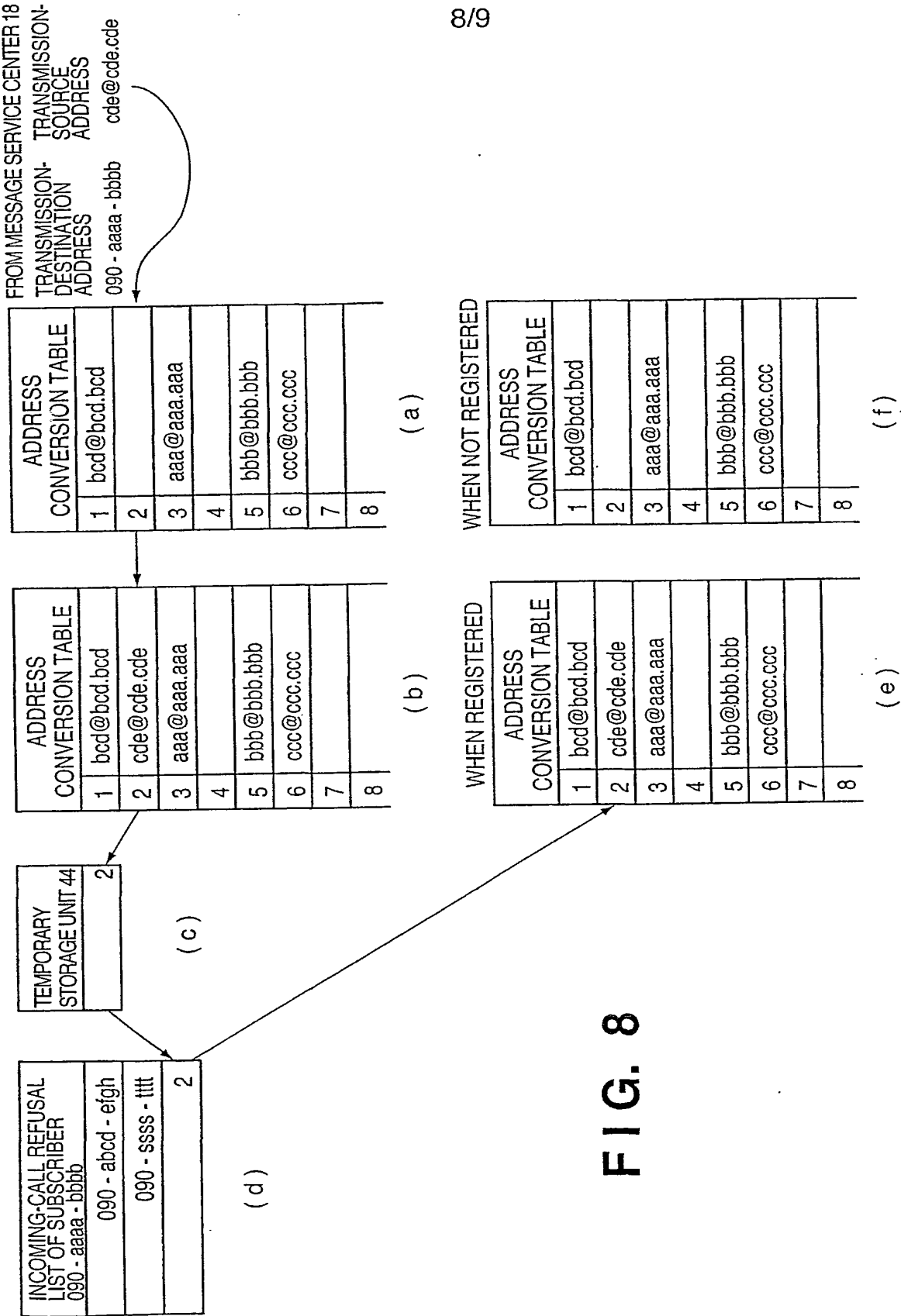
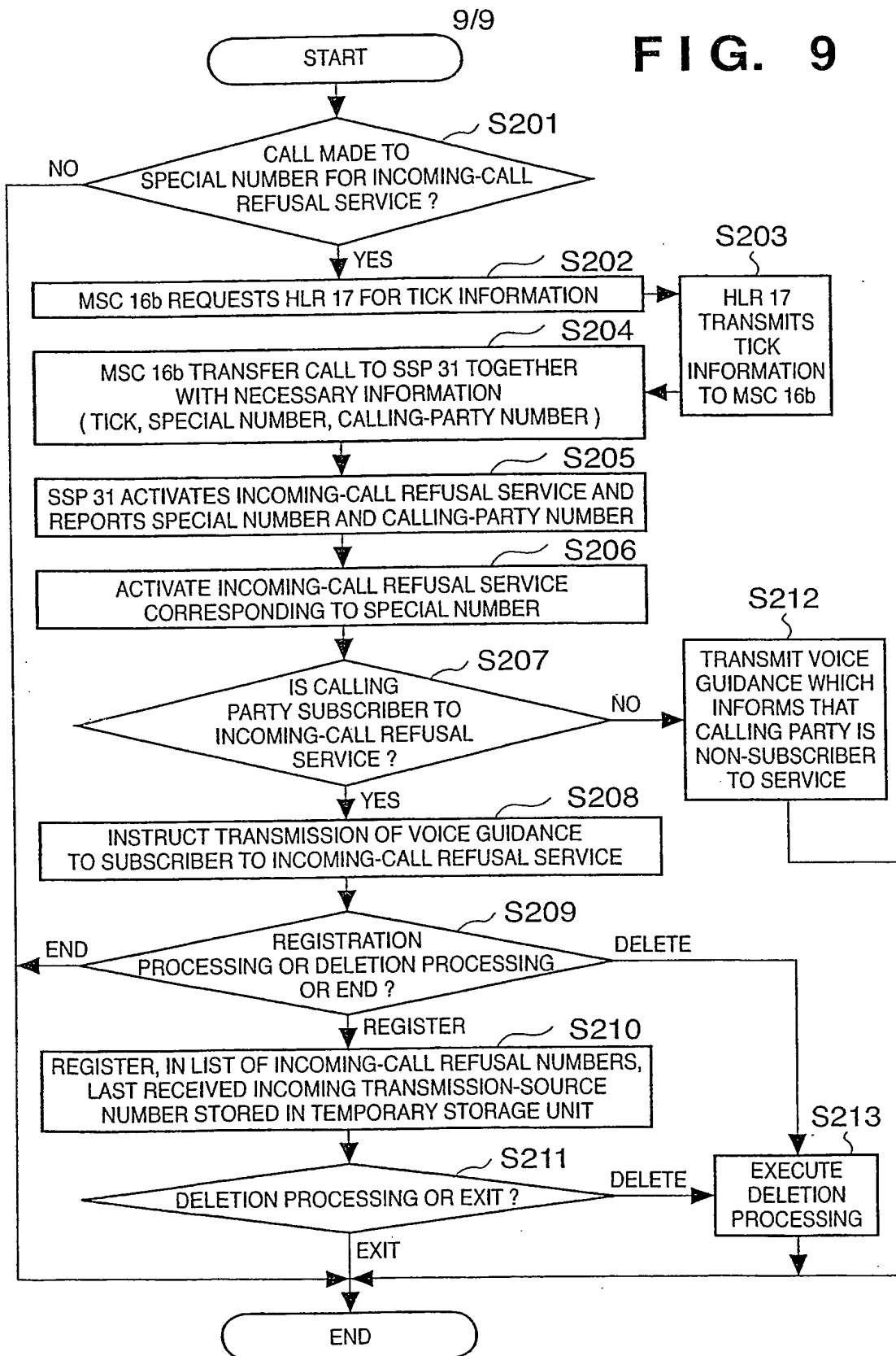


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No
PCT/JP 01/04396

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q H04M H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 27726 A (ERICSSON GE MOBILE INC) 3 June 1999 (1999-06-03) page 2, line 25 -page 3, line 24 page 9, line 32 - line 37 page 10, line 25 - line 34	1
A	US 5 930 700 A (SOPER E SCOTT ET AL) 27 July 1999 (1999-07-27) column 1, line 29 - line 33 column 2, line 62 -column 3, line 10 column 3, line 12 - line 63 column 5, line 19 - line 42	1-5
A	GB 2 327 318 A (ERICSSON TELEFON AB L M) 20 January 1999 (1999-01-20) page 3, line 12 -page 5, line 5	1-5

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

16 October 2001

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 01/04396

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